Name:

at1117paper: Complete the Square (v310)

Example

A square's edge length is x feet. A rectangle has a height of x feet and a width of 32 feet. Their combined area, found by adding the square's area and the rectangle's area, is 320 square feet. What is the value of x?

Example's Solution

$$x^2 + 32x = 320$$

To complete the square, add $\left(\frac{32}{2}\right)^2 = 256$ to both sides.

$$x^2 + 32x + 256 = 576$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 16)^2 = 576$$

Undo the squaring.

$$x + 16 = \pm\sqrt{576}$$

$$x + 16 = \pm 24$$

Subtract 16 from both sides.

$$x = -16 \pm 24$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 8$$

Question 1

A square's edge length is x feet. A rectangle has a height of x feet and a width of 50 feet. The total area, of the square and rectangle, is 1139 square feet. What is the value of x?

$$x^2 + 50x = 1139$$

$$x^2 + 50x + 625 = 1764$$

$$(x + 25)^2 = 1764$$

$$x + 25 = \pm 42$$

$$x = 17$$

Question 2

A square's edge length is x feet. A rectangle has a height of x feet and a width of 36 feet. The total area, of the square and rectangle, is 301 square feet. What is the value of x?

$$x^2 + 36x = 301$$
$$x^2 + 36x + 324 = 625$$
$$(x + 18)^2 = 625$$
$$x + 18 = \pm 25$$
$$x = 7$$

Question 3

A square's edge length is x feet. A rectangle has a height of x feet and a width of 24 feet. The total area, of the square and rectangle, is 385 square feet. What is the value of x?

$$x^2 + 24x = 385$$
$$x^2 + 24x + 144 = 529$$
$$(x + 12)^2 = 529$$
$$x + 12 = \pm 23$$
$$x = 11$$